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Terms: [patno=4823070](#) (Edit Search)

07082989 (07) 4823070 April 18, 1989

UNITED STATES PATENT AND TRADEMARK OFFICE GRANTED PATENT
4823070

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April 18, 1989

Switching voltage regulator circuit

REISSUE: December 10, 1996 - Reissue Application filed Dec. 10, 1996 (O.G. Aug. 12, 1997) Ex. Gp.: 2111; Re. S.N. 08/794,374 Reissue Application filed Nov. 16, 1995 (O.G. Mar. 26, 1996) Ex. Gp.: 2111; Re. S. N. 08/558,024 Reissue Application filed Apr. 10, 1991 (O.G. May 21, 1991) Ex. Gp.: 212 August 12, 1997

INVENTOR: Nelson, Carl T., San Jose, CA

APPL-NO: 07082989 (07)

FILED-DATE: August 3, 1987

GRANTED-DATE: April 18, 1989

ASSIGNEE-AT-ISSUE: Linear Technology Corporation, Milpitas, CA

LEGAL-REP: Rogers, Laurence S.

PUB-TYPE: April 18, 1989 - Utility Patent having no previously published pre-grant publication (A)

PUB-COUNTRY: United States (US)

REL-DATA:

Addition of Ser. No. 932158, November 18, 1986

US-MAIN-CL: 323#285

US-ADDL-CL: 323#299, 363#021

SEARCH-FLD: 363##20, 363##21, 363##97, 363##131, 323##282, 323##284, 323##285, 323##299, 323##267

IPC-MAIN-CL: G 05F001#563

PRIM-EXMR: Salce, Patrick R.

ASST-EXMR: Peckman, Kristine

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12/10/02

US 4,823,070

07/683549

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?us4823070/pn

** SS 1: Results 1

Search statement 2

?prt fu legalall max

1/1 PLUSPAT - (C) QUESTEL-ORBIT- image
CPIM (C) Questel-Orbit
PN - US4823070 A 19890418 [US4823070]
TI - (A) Switching voltage regulator circuit
PA - (A) LINEAR TECHN INC (US)
IN - (A) NELSON CARL T (US)
AP - US8298987 19870803 [1987US-0082989]
PR - US8298987 19870803 [1987US-0082989]
- US93215886 19861118 [1986US-0932158]
EC - H02M-001/00S
- H02M-003/335C
- H02M-003/335C4
PCL - ORIGINAL (O) : 323285000; CROSS-REFERENCE (X) : 323299000
DT - Basic
CT - US4146832; US4209826; US4253137; US4425612; US4641229; US4652808
- Data sheet, "Switching Dc-to-DC Microconverters--LSH 6300 Series",
date unknown.

Data sheet, Unitrod UC 1846 Current Mode PWM Controller integrated circuit, 12/83.

Documents relating to the Linear Technology Corporation LT-1070 integrated circuit.

STG - (A) United States patent
AB - An integrated circuit for use in implementing a switching voltage regulator, the integrated circuit including a power switching transistor, driver circuitry and control circuitry, which is operable in a normal feedback mode or an isolated flyback mode. The integrated circuit includes shutdown circuitry for placing the regulator in a micro-power sleep mode, and can be packaged in a five-pin conventional power transistor package. The terminals of the integrated circuit regulator perform multiple functions. A compensation terminal is used for frequency compensation, current limiting, soft-start operation and shutdown. A feedback terminal is used as a feedback input when the integrated circuit is in feedback mode, and as a logic pin to program the regulator for isolated flyback operation. The feedback terminal is also used to trim the flyback reference voltage.

1/1 LGST - (C) LEGSTAT
PN - US 4823070 [US4823070]

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US 4,823,070

07/683549

AP - US 82989/87 19870803 [1987US-0082989]
DT - US-P
ACT - 19870803 US/AE-A
APPLICATION DATA (PATENT)
{US 82989/87 19870803 [1987US-0082989]}
- 19890418 US/A
PATENT
- 19910521 US/RF
REISSUE APPLICATION FILED
910410
- 19960326 US/RF
REISSUE APPLICATION FILED
951116
- 19970812 US/RF
REISSUE APPLICATION FILED
961210
UP - 1997-38

1/1 CRXX - (C) CLAIMS/RRX
AN - 1935445
PN - 4,823,070 A 19890418 [US4823070]
PA - LINEAR TECHNOLOGY CORP
PT - E (Electrical)
ACT - 19910410 REISSUE REQUESTED
Issue Date of O.G.: 19910521
Reissue Request Number: 07/683549
Examination Group responsible for Reissue process: 212

- 19951116 REISSUE REQUESTED
Issue Date of O.G.: 19960326
Reissue Request Number: 08/558024
Examination Group responsible for Reissue process: 2111

- 19961210 REISSUE REQUESTED
Issue Date of O.G.: 19970812
Reissue Request Number: 08/794374
Examination Group responsible for Reissue process: 2111

UP - 1999-00

1/3 PAST - (C) Thomson Derwent
AN - 199732-001445
PN - 4823070 A [US4823070]
DT - A (UTILITY)
OG - 1997-08-12
CO - REA
ACT - REISSUE APPLICATION FILED
SH - REISSUE APPLICATION FILED

2/3 PAST - (C) Thomson Derwent
AN - 199613-000643
PN - 4823070 A [US4823070] /
DT - A (UTILITY)
OG - 1996-03-26
CO - REA
ACT - REISSUE APPLICATION FILED
SH - REISSUE APPLICATION FILED

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3/3 PAST - (C) Thomson Derwent
AN - 199105-001581
PN - 4823070 A [US4823070]
DT - A (UTILITY)
OG - 1991-05-21
CO - REA
ACT - REISSUE APPLICATION FILED
SH - REISSUE APPLICATION FILED

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1/1 INPADOC - (C) INPADOC
PN - US 4823070 A 19890418 [US4823070]
TI - SWITCHING VOLTAGE REGULATOR CIRCUIT
IN - NELSON CARL T [US]
PA - LINEAR TECHN INC [US]
AP - US 82989/87-A 19870803 [1987US-0082989]
PR - US 932158/86-A1 19861118 [1986US-0932158]
IC - G05F-001/563

1/1 LEGALI - (C) LEGSTAT
PN - US 4823070 [US4823070]
AP - US 82989/87 19870803 [1987US-0082989]
DT - US-P
ACTE- 19870803 US/AE-A
APPLICATION DATA (PATENT)
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- 19910521 US/RF
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- 19960326 US/RF
REISSUE APPLICATION FILED
951116

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961210
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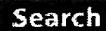
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tors
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600 μ song, an external
shown in Fig. 45
a few microseconds

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S-9479

HOW TO OBTAIN BOTH RESET AND POWER FAIL

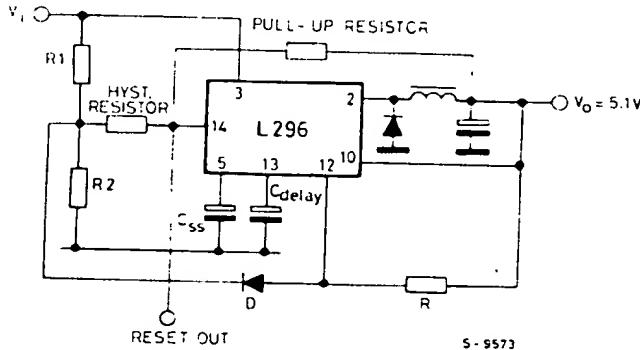
Figure 46 illustrates how it is possible to obtain at the same time both the power fail and reset functions. By adding one diode (D) and one resistor (R) in the feedback line, the reset delay time (pin 13) can only

occur when the output voltage is $V_{O_{min}}$ when the voltage across R_2 is higher than 4.5 V.

By choosing the right values for the hysteresis resistor it is possible to fix the in-

put on 10% hysteresis in order to increase immunity to the 100-Hz ripple present on the supply voltage. Moreover, the power fail and reset delay time are automatically locked to the soft start. Soft start and delayed reset are thus two sequential functions. The hysteresis resistor should be in the range of about 100 $\text{k}\Omega$ and the pull-up resistor of 1 to 2.2 $\text{K}\Omega$.

Figure 46.



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